There is only one way to learn practical chemistry, and that is to study the work as well as do it. A student should not pass from an estimation until he knows definitely the reason for every step in the process, how it can be proved to be complete, and why the operation is done in the way it is rather than in an alternative way. He should make a rule of proving that his product is what he means it to be, and that it is pure. In short, he should make a thorough study of every piece of work. He may get fewer results, but he will have learned more chemistry, and he will have gained the only true confidence, namely, that founded on knowledge.

We deprecate, as a rule, general instructions, such as that every precipitate should be ignited two or more times until it ceases to change in weight. Some products need it, some do not. The point for consideration is, What is present that it is desired to get rid of by the ignition, and what conditions are necessary to eliminate it with certainty? Unless the student knows this and concentrates his attention upon it, he is working by mere rule of thumb. As to purity of product, we have known a conscientious and careful worker to get a good result for one of the minor constituents of an ore, but when it was suggested that he should examine the product that he had weighed, he did so, and found that it did not contain even a trace of the compound of which he thought it consisted.

(1) The manual by Drs. Cumming and Kay is an excellent text-book for students. It includes a full course of mineral analysis, finishing with instructions for the analysis of several alloys and ores, gas analysis, water analysis, organic analysis, the determination of molecular weights, and various desirable tables. There are many helpful and practical hints, though we think that some parts might profitably be a little expanded on the lines indicated above. The method of igniting ferric hydrate without separation from the filter paper containing it is, of course, not original with the authors, but we think that it will be found generally to lead to a notably short weight, because the reoxidation of the reduction products is very uncertain.

(2) This "Part" of Messrs. Neville and Newman's course deals only with exercises on "pure organic chemistry." It covers the examination of many classes of organic bodies, finishing with proteins and enzyme action. It is a well-arranged course for students of agriculture. Like so many others who refer to the production of acetaldehyde for detection purposes, the authors describe its odour as characteristically fruity.

(3) The "Chemical Calculation Tables" include a five-figure table of logarithms with a double thumb index that enables the user to turn immediately to any desired page either backwards or forwards. There are extensive tables of factors and weights, giving both the number and the logarithm, and tables referring to gas calculations and molecular weight determinations. It is exactly what one wants to facilitate calculations in the laboratory.

C. J.

Botanical Guides.

(1) *Applied Economic Botany: Based upon Actual Agricultural and Gardening Projects.* By Dr. M. T. Cook. (Farm Life Text Series.) Pp. xviii + 261. (Philadelphia and London: J. B. Lippincott Co., 1919.) Price 7*s.* 6*d.* net.

(2) *Some Familiar Wild Flowers.* Photographed by A. E. Sulman. Pp. ii + 65. (Sydney: Angus and Robertson, Ltd., n.d.) Price 1*s.* net.

(3) *Australian Wild Flowers.* Photographed by A. E. Sulman. Second Series. Pp. ii + 61. (Sydney: Angus and Robertson, Ltd., n.d.) Price 1*s.* net.

(4) *A Popular Guide to the Wild Flowers of New South Wales.* By Florence Sulman. Vol. ii. Pp. xxxi + 249 + 71 plates. (Sydney: Angus and Robertson, Ltd., 1914.) Price 6*s.* net.

(1) THE title of Dr. Cook's book is misleading; from the preface we learn that it is intended as a guide to experimental work in the study of plants, such as should be carried on in any high school, and as a preliminary work to the agricultural studies which are now recognised in many high schools. These objects would be served by a good general practical introduction to the study of plant life, and this, we gather, is what Dr. Cook is attempting. Part i., "Plant Life," occupies nearly three-fourths of the volume. Beginning with the seed and seedling, the form of the various plant organs and their uses to the plant are described in successive chapters, and exercises for practical work are suggested at the close of each chapter. A short chapter on the anatomy of the angiospermous plant follows, then a brief description of the chemical composition and a chapter on plant food and growth, and finally very short chapters on the Gymnosperms, ecological relations, forestry, plant-breeding, weeds, Pteridophytes, Bryophytes, Thallophytes, and Bacteria.

The remainder of the book, part ii., entitled "Important Families of Economic Plants," is an account of a number of plants of economic value arranged in their families, with a short and often very inadequate description of the characters of each family. The general effect is scrappy. There

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are a large number of figures, many of which are good, but others are poor, as, for instance, some of those in the chapter on flower-types. A photograph of two ripe ears of Indian corn is described as the pistillate flower. The use of the terms "endogenous" and "exogenous" for the stem of the monocotyledon and dicotyledon respectively is not helpful; and to describe the flower as consisting of "leaves which have been greatly modified in shape and colour" may be misleading. Annual rings are invariably referred to as annular rings. The introduction contains excellent advice on methods of studying botany, but the book as a whole is disappointing.

(2) and (3) The two little books by Mrs. Annie Sulman form a series of very fair reproductions of photographs of some of the common Australian wild flowers, and each is very well worth the shilling. There is no letterpress apart from the short preface and index; the botanical and, where such exists, the popular names are given below each plate, and the colour of the flower is indicated. There is little attempt at arrangement; generally the species of the same genus are brought together, but members of the same family appear in different parts of the books. If the author would arrange the plants in some definite sequence and indicate in each case the family to which the plant belongs, she would add to the usefulness of these little volumes.

(4) Miss Sulman's "Popular Guide to the Wild Flowers of New South Wales" is complementary to the volume previously issued. It forms a very handy and well-arranged working flora descriptive of a large number of New South Wales flowering plants, illustrated by clear, well-drawn, and eminently helpful full-page illustrations. The arrangement is that of Bentham's "Flora Australiensis." There are a useful illustrated glossary, a list of books of reference, a key to the families, twenty-nine of which are included, and, at the end of the volume, a colour index, by which a clue may be obtained to the name of a flower. The descriptions of the plants are clearly written, and a great deal of information is given in a small space.

Our Bookshelf.

Agriculture and the Farming Business. By O. H. Benson and G. H. Betts. Pp. xvi + 778. (London: Kegan Paul and Co., Ltd., n.d.) Price 10*s*. 6*d*. net.

MESSRS. BENSON AND BETTS have essayed an ambitious task; it is no less than to make their volume a clearing-house for the mass of valuable scientific information about agricultural problems now accumulated at experiment stations and colleges, but not always wanted by practical farmers. Although the book emanates from a London publisher, it is entirely written for the American farmer.

The scope of the book is unusually wide; it deals with office equipment, crops, animals, manures, soil fertility, implements, motor-cars, roads, education, recreation and health; and finally there is a miscellaneous chapter including such diverse subjects as the removal of stains, the quantity of seed to sow per acre, a planting table, etc. Full information about all these things could scarcely be expected, and yet a vast amount of material is collected. Unfortunately, it is of very unequal value; there are few tables of figures and practically no references; the student wishing to check the data cannot do so, and the farmer seeking information is not told where he can obtain it. Thus, under "The Origin of Wheat," the only information given is: "Just where wheat came from none can say. Some think it originated in the Valley of the Nile or the Euphrates, or possibly that it may have come from Sicily. Wherever it originated, it seems to have developed from one of the wild grasses. Certain scientists think it descended from the lily; others tell us that it is probably a descendant of the wild ammer."

This statement is not very satisfying. Like many others in the book, however, it might serve to whet the farmer's curiosity, and some good would then be served by references to trustworthy specialised books or bulletins. If a second edition is called for, the authors might well seriously consider these points.

A Geography of Asia. By Joseph Martin. (Macmillan's Practical Modern Geographies.) Pp. viii + 298. (London: Macmillan and Co., Ltd., 1919.) Price 5*s*.

THE tendency of school geography to embrace too much and so to fail in achievement has been avoided in this book, which is well proportioned and thoroughly geographical throughout. Mr. Martin has the courage to omit considerations of geological structure where it has no direct bearing on human activity. Physical explanations of climatic problems are generally omitted. The diagram of the planetary winds is an improvement on that produced in most text-books, but should have the polar high-pressure areas added. Asia is treated under the larger natural regions, but these are not allowed to obscure the political units which are an essential to a full understanding of world geography.

Each chapter is prefaced by some simple statistical matter on which is based a number of exercises designed in the main for oral answers. At the end of each chapter are a number of mapping exercises. The extent to which wide generalisations are admissible in school geography will always be a disputed point, but statements that certain climates are unhealthy to Europeans, if true, require explanation. Even a school geography should emphasise the part played by the mosquito.

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